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ABSTRACT

Addressing the difficulty encountered by many vocational students in narrowing, focusing, developing, and structuring their ideas for technical writing projects, a computer program was designed to provide these students with a simple, time-saving method of brainstorming and organizing their thoughts. By asking thought-generating questions concerning possible approaches, organization structure, and resources to consider, the computer program eventually leads the student to create a specific thesis statement and presents the student with a printout of his or her thinking. It also contains subprograms that detail instructions for using the main program, presents an overview of technical report writing, and provides guidelines for documentation. Responses to a questionnaire completed by approximately 35 vocational students who had used the program indicated that the program helped them to (1) get started on the technical report assignment sooner than they normally would have; (2) proceed with a clearer idea of their specific purpose; (3) complete their reports more quickly and with less difficulty, particularly in terms of narrowing a broad subject to a manageable topic; (4) write reports that conformed more closely to accepted standards of format and documentation style; and (5) become more confident and eager to begin their research. (JD)

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Final Report

Project No. 86-4.01.155

Computer-Assisted Pre-Writing for Vocational Students

Curriculum Development Project
Conducted Under
Public Law 94-482

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ABSTRACT

Problem Area

What prompted the program's development was the difficult time many vocational students have in planning and organizing a written approach to a subject that may have several sub-divisions and facets. It was designed, therefore, to lead the student through a series of pre-writing questions that required thoughtful answers before the actual writing process began. Using the speed and versatility of the computer to provide the student with a simple, time-saving method of brainstorming and structuring a technical report idea seemed to be a logical solution.

Major Activities

The computer program asks thought-generating questions concerning the reader's needs, the writer's interests, narrowed pieces of the subject, possible approaches, paper organization structures, and resources to consider, eventually leading the student to create a specific thesis statement. It then presents the student with a printout of his or her thinking.

The program also has menu-driven sub-programs which give instructions for using the main program, present an overview of technical report writing, and detail the current Modern Language Association guidelines for citing sources. The latter two sub-programs also provide a printout summary of their contents.

Conclusions and Recommendations

The program accomplished what it intended. The vast majority of students who used the program credited it with getting them started on the technical report assignment sooner and with a clearer idea of their specific purpose. Those students with minimal typing skills needed more time than anticipated to complete the main program, particularly if they also wished to read the sub-programs' advice on report format and documentation style.

There were some general differences in the quality of the reports generated by students who used this program compared with those generated by students who did not use it. First, the reports submitted by students who had used the program were completed more rapidly and with less difficulty particularly in terms of narrowing a broad subject to a manageable topic. Second, the reports submitted by students who had used the program conformed more closely to accepted standards of format and documentation style. Finally, it seemed that the students who had used the program were more confident and more eager to begin their research, requiring less time and less encouragement to produce their first meaningful writing.

Problem Area

The situation that required change was that computer-assisted writing was not being integrated into basic and technical writing programs for vocational students. This situation affected students in major technical fields including business, accounting, law enforcement technology, water resources and engineering technician fields. Many students in these areas have had a difficult time planning, focusing and organizing their thoughts on paper. There was no simple process open to them to brainstorm and refine concepts prior to actually writing. Consequently, many of these students did not enjoy and benefit fully from the technical report/research process. In addition, because technical writing classes tend to be large, a process was needed by which students could explore and refine paper ideas without requiring an instructor's full attention. This situation suggested that a computerized pre-writing program might lead a student through this pre-writing process to produce more efficiently an acceptable written product.

Project Objective

The objective of the project was to write, test, refine and use a computer program that would help students develop and organize ideas for technical writing projects. The main program, through a series of prompts, would help students narrow and focus their written message. It would then present them with a printout of their pre-writing thought process. In this way, the students could more quickly and easily explore an idea and learn techniques to focus their message and improve their written assignments.

The final product would be a generic computer-assisted pre-writing program that students in many fields could use to make their pre-writing tasks easier and more productive.

By the end of the project, students in one technical writing class would have had access to the program when a technical report was assigned. These students and the instructors who evaluate their written work would then be asked if the program had, in fact, improved the quality and the efficiency of the writing experience.

Description of the general project design.

The entire program was written in standard BASIC because of the ease with which BASIC handles strings (text). Three machine language sub-routines were used for a more attractive screen display. The total program occupied about 72 kilo bytes of memory broken down as follows:

--The main program	(CAPW.308)	24	kilo bytes
--The opening menu	(MENU)	2	kilo bytes
--Review and printout of responses ...	(REVPRNT.308) ..	11	kilo bytes
--Paper format help	(FORMAT.308) ...	10.5	kilo bytes
--Opening credits	(START)	0.75	kilo bytes
--Documentation help	(DOCU.308)	8	kilo bytes
--Directions for the main program	(INFORM.308) ...	8	kilo bytes
--User identification	(USER.ID)	4.5	kilo bytes
--Machine language source code for screen display .	(DLIST.SRC)	2	kilo bytes
--Machine language object code for screen display .	(DLIST.OBJ)	0.35	kilo bytes
--User I.D. storage	(UINFO)	0.20	kilo bytes
--User response storage	(UDATA)	0.75	kilo bytes

The main menu presents the student with four options:

--INFORMATION
--MAIN PROGRAM
--FORMAT HELP
--DOCUMENTATION HELP

The INFORMATION option loads INFORM.308 which gives the student directions for using the main program.

The MAIN PROGRAM option first loads USER.ID which asks for the student's name, class, instructor, and the date. This information is then saved in the file UINFO. Next, the main program (CAPW.308) is loaded along with the object code file DLIST.OBJ for the screen display. When the student completes the twelve questions, the responses are stored in the file UDATA. At this point the student has the option of quitting or reviewing answers and/or receiving a printout of responses. If review is selected, the program REVPRNT.308 provides the student with an on-screen review and a written printout.

The FORMAT HELP option loads FORMAT.308 which provides information and examples of the various pages of a technical report. A printout option is available at the end of this program.

The DOCUMENTATION HELP option calls DOCU.308 which explains the recent M.L.A. guidelines for citing sources and, if requested, produces a printout summary.

Details of the MAIN PROGRAM

The main program is the heart of the process; it asks questions and gathers responses from the student. The screen display is divided into five sections with each section a different color for ease of recognition. The top section contains lines for the student's subject and eventually the narrowed topic.

The second section is seven lines high. This is where the questions are presented.

The third section is one line high. It is used for the prompt "PLEASE TRY TO ADD TO YOUR ANSWER" if the student's response is less than 110 characters (about two screen lines).

The fourth section is seven lines high. This contains a mini word processor for the student's responses. Minimal editing is allowed.

The fifth section contains information on the keystrokes necessary to call the help screens and to move to the next question. It is three lines high.

The twelve questions are asked in the following order:

QUESTION ONE asks the student to type in the name of a subject he or she would like to develop using this program. The subject statement is limited to three words.

QUESTION TWO asks the student what he or she finds appealing about the subject. Granted, sometimes instructors assign subjects that are initially unappealing to students, but this is, nevertheless, an important question for the student to consider at least for the reader's sake.

QUESTION THREE prompts the student to ask basic questions about the subject (who, what, when, where, why, how) and produce a list of answers.

QUESTION FOUR asks the student to select one of the responses from question three. This choice will become the topic to be explored further in the program.

QUESTION FIVE asks the student to examine what he or she already knows about the topic. Often students know more than they realize, and this helps them feel more comfortable about researching a seemingly unfamiliar topic.

QUESTION SIX asks the opposite of five: What are some knowledge gaps that the research will fill in.

QUESTION SEVEN asks the student to list various resources to which he or she might turn to fill in the knowledge gaps. Several examples are given to prompt a response.

QUESTION EIGHT asks the student to consider who the reader will be. The help screen reminds the student that very often a reader might be an intelligent nonspecialist rather than on who is well versed in the technical field.

QUESTION NINE asks the student to consider what response he or she will want from the reader after the reader finishes the report. Advice and examples are given on the help screen.

QUESTION TEN asks the student to consider the possible structure of a paper about the topic. The help screen provides many possibilities from which to choose.

QUESTION ELEVEN asks the student to consider what visual aids might be appropriate for a paper on this topic. Again, several possibilities are suggested.

QUESTION TWELVE requires the student to fill the blanks in the following sentence: THE PURPOSE OF MY REPORT IS TO _____ SO THAT MY READER WILL BE ABLE TO _____. This completed sentence will hopefully become the thesis of the report and allow the student to begin immediately his or her search for information.

Results and Accomplishments

The project accomplished what it intended; it demonstrated that a computer program could assist students in more quickly focusing a technical report assignment. Those students with minimal typing skills found entering their responses a bit frustrating and, because of this, tended to produce shorter answers. Answers that the program considered too short, less than two screen lines, generated a 'please add to your answer' prompt. This did help encourage these slower typists eventually to produce an answer of workable length.

The program was designed so that help screens for each of the questions could be tailored to a particular technical field. The help screens in the test program were designed for civil engineering technology students. However, a few minutes editing the code could make the help screens applicable to almost any technical field.

Approximately thirty-five students used the program. Each was then asked to complete a questionnaire concerning his or her experience with the program. Questions ranged from the generic did-it-help to specific questions concerning the applicability and sequence of the questions asked. In addition, the questionnaire asked the student's opinion of the format help and documentation help sub programs. In addition, each of the test group was interviewed about the experience. The written and oral reactions indicated the following:

All thirty-five felt that the program was very much worth their time and that the research task ahead of them was made easier because of the experience.

Two of the thirty-five isolated particular help screens that needed better examples or clearer wording. The code was revised to accommodate their suggestions.

Three of the thirty-five suggested a slight modification of the sequence of the questions, but none of the thirty-five took exception to a particular question's value, nor did any student suggest a question that was not asked by the program.

Twenty-four of the thirty-five were interviewed a second time after their reports were completed. Responses affirmed their initial reactions: The program made the research experience easier, more enjoyable, and more successful.

Though instructors did not notice any obvious difference in the quality of the papers submitted by these test students, the students felt that, because of the program, it had taken them less time to produce a competent paper.

Conclusions, Implications, Recommendations for the Future

Because of the positive responses from the students, I believe the program is worth converting to other computer architectures that inhabit other institutions. The original code was written on an ATARI 800XL with 64 kilo bytes of RAM. Conversions to other architectures such as Apple and IBM would not be as visually pleasant and might well operate more slowly because of the inferiority of Apple and IBM design to that of ATARI, but the conversions would nevertheless benefit students.

Project Dissemination Activities

I have attempted to make the ATARI version of the program available to all students on this campus by offering to donate and ATARI computer and disk drive to the college. This offer has not meant with gleeful acceptance. The policy is that non-IBM and non-HP hardware is not allowed. This is unfortunate. Computer-literate people who have studied various architectures should be aware that a $4000 system such as the IBM is not needed for most educational applications that can be enriched by a computer.

The policy of buying only IBM or HP compatibles is intended to insure that new equipment can be connected to existing equipment and that new software hopefully can be run on older machines. In this way, the college eventually saves money. Unfortunately this argument precludes saving the taxpayers money when a stand-alone system would do just as well for a specific application. Such is the case with this program: It is designed to be run from a single study station in a learning lab; it is not the sort of program that requires networking throughout an entire college.

To establish a station to run this program as it now exists would cost at most $500 or one-eighth the cost of an IBM PC that boasts little more that more memory. At present, the program sits on the disk. I did, however, enjoy immensely working on the project, and the proof of its value still lies in the minds and the technical reports of those students who were kind enough to help refine it.